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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/212,915	12/16/1998	HIDEMI TAKASU	A28838-I-A	7678

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EXAMINER

ESTRADA, MICHELLE

ART UNIT PAPER NUMBER

2823

DATE MAILED: 12/03/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/212,915

Applicant(s)

TAKASU, HIDEKI

Examiner

Michelle Estrada

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 23 October 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1 and 3-9 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1 and 3-9 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ 6) ☐ Other: _____

DETAILED ACTION

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 10/23/03 has been entered.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1 and 3-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Japanese Patent 63-261833 (Japan '833) in combination with Wolf (Vol. 1), and further in view of Bayraktaroglu (US 5,166,083).

Japan '833 discloses formation of a buried layer by implantation of either p-type or a n-type conductive impurity through an opening in a patterned layer followed by annealing and formation of an epitaxial layer on the substrate surface. The use of a photoresist layer on a patterned insulating layer as the implantation mask is disclosed to be entirely conventional by Wolf (Vol. 1, p.

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322). The reference does not appear to anneal in an oxidizing atmosphere, and thus discloses annealing in a non-oxidizing atmosphere, because the oxide formation and removal prior to epitaxial growth are not depicted. Alternatively, It would have been within the scope of one of ordinary skill in the art to omit oxidizing species from the annealing atmosphere because oxide formation is not disclosed as desired or depicted as occurring. Furthermore, Wolf discloses annealing in a non-oxidizing atmosphere (p. 305, 2nd paragraph). It would have been within the scope of one of ordinary skill in the art to combine the teachings of Wolf (p.305) with the process of the combination to enable the annealing step to be performed. Moreover, this will reduce oxide induced stacking fault (Wolf, p. 305). Heating of the substrate for some time period after the anneal step is in practice unavoidable when desiring to fully activate the implanted ions. Diffusion of the implanted impurities to expand the implanted region necessarily takes place during the anneal (Wolf, p. 307, third full paragraph). Wolf discloses epitaxial growth at temperatures equal to and above 1000°C to be conventional (p.136, fig. 14). It therefore would have been within the scope of one of ordinary skill in the art to perform the epitaxial growth step of Japan '833 at the temperatures equal to and above 1000°C shown to be suitable by Wolf. It also would have been within the scope of one of ordinary skill in the art to perform the epitaxial growth without cooling the wafer after annealing and diffusion of the implanted ions because cooling of the wafer is not disclosed as necessary by Japan '833 and because epitaxial growth temperature is higher than the annealing and diffusion temperatures. In view of the discussion of the prior art

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process in Japan '833 as well as the process of the invention it is clear that the silicon surface through which the implantation takes place is the same surface on which epitaxial growth takes place as opposed to a surface that is exposed by removal of an oxide layer formed during annealing (See p. 5, first full paragraph and p.6, 2nd paragraph, for example).

Neither reference discloses that the various steps are carried out all in the same reactor furnace. Bayraktaroglu discloses implanting ions in the substrate, activating them and epitaxial growth of a layer, all carried out in the same reactor chamber (Col. 3, lines 57-66). It would be within the scope of one of ordinary skill in the art to employ the method of Bayraktaroglu for its disclosed intended purpose to achieve the epitaxial layer formation step of the combination.

The examiner takes official notice that providing a cleaning gas such as H₂ or HCl to clean up the surface of the substrate was known at the time of the applicant's invention. It would have been within the scope of one of ordinary skill in the art to employ the known process for its known intended purpose to achieve the steps of the combination.

The choice of particular temperatures for the annealing/activation and epitaxial growth steps would have been a matter of routine optimization because temperatures for the steps are recognized as result effective variables. See MPEP 2144.05.

Response to Arguments

Applicant argues that the temperature recited in claim 1, lines 12-13 is not within the range that would be arrived at through routine optimization in view of the teachings of the reference. The result recited in line 13 appears to be due to absence of oxidizing species in the annealing atmosphere (Wolf 305 and Specification, p. 13, last paragraph).

Applicant argues that activation of implanted does not require or imply annealing. However, activation is an annealing process. *to restore crystal structure.*


Applicant argues that there is no suggestion in any of the references and the Examiner has not even cited any part of a reference in support of an assertion that the modifications require to meet the claim requirements are suggested in the prior art. However, motivation has been provided in the office action mailed 11/18/02.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michelle Estrada whose telephone number is (703) 308-0729. The examiner can normally be reached on Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri can be reached on 703-306-2794. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 for regular communications and 703-308-7724 for After Final communications.

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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.



George Fourson
Primary Examiner
Art Unit 2823



MEstrada
November 26, 2003